

REMARKS

Claims 1-19 are pending in the present application. Claims 1, 9, 13, 17, 18, and 19 are independent.

Allowable Subject Matter

Applicant appreciates the Examiner's indication that claims 3, 4, 6, 7, 10, 11, 14, and 15 recite allowable subject matter and would be allowed if rewritten in independent form including all of the features of the base claim and any intervening claims.

With respect to the Examiner's reasons for allowance, Applicants wholeheartedly agree that the prior art fails to teach or suggest the particular equations recited in these claims and repeated in the Office Action. Applicant does wish to point out, however, that these claims are deemed to be patentable because of the full combination of features recited therein. In other words, the Examiner's Statement of Reasons For Allowance is not to be viewed as the sole reason as to why these claims are deemed allowable but merely as one reason for providing such patentability. Indeed, it is the full combination of features recited in the claims which patentably define over the prior art.

Art Rejections

Claims 1, 2, 5, 8, 9, 12, 13, and 16-19 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Van de Poel (USP 6,061,091) in view of Kim (USP 6,018,588). This rejection, insofar as it pertains to the presently pending claims, is respectfully traversed.

Van de Poel is directed to a method and apparatus for detecting and correcting specular reflections in digital image data. Such specular reflections are typically the result of a studio lamp or other bright light sources which cause specular reflections that are captured by a digital camera. Such specular reflections degrade the image quality and Van de Poel seeks to correct them.

To correct specular reflections, Van de Poel first forms histograms of the pixel densities. These density histograms are shown in Figs. 2 and 3.

Van de Poel clearly defines the term "density" in column 6, lines 16-19 and 45-50. As stated therein, the term "density" corresponds to the intensity of light incident on the photo-sensitive elements used to capture the image. More precisely, the density value X is mathematically related to the intensity of light I (detected by the detector CCD array) by the following equation $X = 4095 - I$.

Applicant emphasizes that the term "density" as used by Van de Poel is a completely different concept and basis of operation than that disclosed and claimed by the present invention. Clearly, Van de Poel defines density as the magnitude or intensity of the light detected by the corresponding pixel of a CCD array or other detector. This is quite a different concept than the claimed brightness. For example, independent claim 1 specifically recites the feature of defining the brightness of each pixel based on three mutually independent components that express a pixel value. In other words, brightness is based on all three color components together which is a concept completely absent and not disclosed or suggested by the density values utilized by Van de Poel.

Although Van de Poel does disclose an embodiment with three color channels (see column 13, line 33 through column 14, line 10), separate density values are computed for each of the three color channels. Furthermore, any gradation correction performed by Van de Poel is done on a color-channel-by-color-channel basis. There is certainly no disclosure or suggestion of defining the brightness for each pixel based on three mutually independent components that express each pixel value.

The Office Action apparently ignores the major distinctions between density and brightness. Clearly, these two terms define very different things in an image. Van de Poel is clearly relied

upon to teach most of the claimed inventive features including brightness and processing based on brightness. Van de Poel, however, fails to disclose or suggest calculating a brightness value or processing brightness to correct the image. Instead, Van de Poel is solely directed to density correction which is a completely different concept than that which is claimed. These arguments apply to all of the claims because all of them clearly process pixel brightness, not density.

Further, in regard to independent claim 1, Van de Poel also fails to disclose or suggest determining a rate of pixels based on a number of pixels having a maximum brightness among all pixels. As pointed out above, Van de Poel's basis of operation is density not brightness. Even if density and brightness could somehow be equated (which is clearly incorrect), Van de Poel's method and apparatus certainly does not determine a rate of pixels based on a number of pixels having a maximum brightness.

The Office Action equates the region X1 - X2 in the density histogram as showing pixels having a maximum brightness. This is clearly incorrect at least because the histograms formed by Van de Poel are of density values and not brightness. Even if they were of brightness, the region X1 - X2 is not a count (rate) of pixels having a maximum value. Instead, this region X1 - X2 defines a range of density values or bins in the density histogram. It is not

understood how such a range of values can be equated with a maximum value even if this histogram were brightness which it clearly is not.

As discussed in the specification, a problem with the conventional art is clipping in which very bright image regions are clipped to a maximum brightness value and, thus, fail to be fully expressed or visualized in the final image. In a basic sense, the invention adjusts the image brightness based on the number (frequency) of pixels having the maximum brightness. In essence, the goal is to prevent highlighted or very bright regions of the image from being overly clipped to a maximum brightness value. This is a concept completely absent from any of the applied art, particularly Van de Poel and Kim even when taken in combination.

Furthermore, the adjustment made by the claimed invention is also completely absent from Van de Poel and Kim even when taken in combination. Particularly in regards to claim 1, the claimed method automatically makes an adjustment to the pixel value based on the determined rate. Recall that the determined rate is based on number of pixels having maximum brightness among all pixels. Brightness is not even a concept anywhere within Van de Poel. Van de Poel further fails to determine a rate of pixels based on the number of pixels having a maximum brightness. Without these bases of operation, Van de Poel is incapable of disclosing or suggesting making an

adjustment to a pixel value based on the determined rate whether manual, automatic or otherwise. Van de Poel simply fails to include these concepts and teaches something very different: namely, density correction of images and not brightness adjustment based on a rate of pixels (number of pixels having a maximum brightness among all pixels in the image). Since Van de Poel is clearly relied upon to teach these features and because these features are clearly absent from Van de Poel, the Office Action rejection must fail.

Further, in regards to claim 9, the applied art also fails to disclose or suggest the features recited therein. Particularly, none of the applied art discloses or suggests brightness analyzing means for computing a histogram of the brightness of the pixels defined based on the three components for the image data. Again, Van de Poel is limited to density derived from a single image component which is completely different than brightness particularly because brightness is based on three mutually independent components of the image data while Van de Poel's density is based on a single image component or color (the colors are not combined in any fashion).

The exposure control means of claim 9 is also absent from Van de Poel. At best, Van de Poel manually adjusts the exposure time for a subsequent image when the previously photographed image density values indicate specular reflections sufficient to decide

density values indicate specular reflections sufficient to decide that the previously photographed image is overexposed. There is no concept of adjusting the exposure value on the basis of the brightness histogram so that a rate of pixels (based on a number of pixels having a maximum brightness among all pixels) becomes a predetermined rate. Again, Van de Poel's histograms are of density value, not brightness. Furthermore, the exposure value is manually changed not at the time of photographing as claimed but with respect to a later photograph to be taken based on a previously photographed image. Further, Van de Poel's exposure timing is manually adjusted by a user and is certainly not based on a brightness histogram. Furthermore, this adjusting of the exposure value in Van de Poel is not based on a brightness histogram such that the rate of pixels becomes a predetermined rate. All of these concepts are completely absent from Van de Poel and Kim fails to remedy these deficiencies as further argued herein.

Further in regards to independent claim 13, neither Van de Poel nor Kim discloses or suggests brightness analyzing means for computing a histogram of the brightness of the pixels defined based on three mutually independent components. As argued above in more detail, Van de Poel's histogram is of density, not brightness. Furthermore, Van de Poel's histogram is of a single image value and

Furthermore, the data transformation means of claim 13 is also not disclosed or suggested by Van de Poel or Kim even when taken in combination. The claimed data transformation means for performing a data transformation process on the basis of the brightness histogram so that a rate of pixels is made to be a predetermined rate. Neither Van de Poel nor Kim determines a rate of pixels as further argued above. Indeed, the density equation used by Van de Poel to determine if the image is overexposed is in no way equivalent and not suggestive of determining a rate of pixels based on the number of pixels having a maximum brightness. Furthermore, there is no data transformation process that transforms pixels so that the rate of pixels is made to be a predetermined rate.

Further, in regards to independent claim 17, the combination of Van de Poel and Kim fails to disclose or suggest defining the brightness of each pixel based on the chrominance value. Van de Poel clearly utilizes individual red, green, and blue values to determine the density of each of these color components. Chrominance is not part of Van de Poel's disclosure. Furthermore, there is no defining of brightness based on chrominance value anywhere in Van de Poel. This feature of defining the brightness must be read together with the determining step and automatically making an adjustment step. Particularly, claim 17 further recites determining a rate of pixels based on the number of pixels having a

maximum brightness among all pixels. This feature is completely absent from the applied art even when taken in combination. Furthermore, none of the applied art automatically makes an adjustment to the pixel value based on the rate (rate is based on the number of pixels having a maximum brightness which is concept completely absent from the applied art).

Further in regards to independent claim 18, the combination of art fails to disclose or suggest the brightness analyzing means for computing a histogram of the brightness of the pixel which is defined based on the chrominance. Like the arguments above presented for claim 17, Van de Poel merely operates based on pixel density on a color-by-color basis and has no disclosure or suggestion of using brightness as the basis of operation. Again, Van de Poel's histogram is of density, not brightness. Furthermore, there is no formation of brightness based on a chrominance value.

These features must read together with the exposure control means of claim 18 which is also absent from the applied art. Particularly, neither Van de Poel nor Kim even when taken in combination discloses or suggests exposure control means for automatically making an adjustment to an exposure value at the time of photographing on the basis of a brightness histogram so that a rate of pixels becomes a predetermined rate. The rate of pixels as defined in this claim is completely absent from Van de Poel and

rate of pixels becomes a predetermined rate. The rate of pixels as defined in this claim is completely absent from Van de Poel and this patent is clearly relied upon by the Office Action to teach this feature. Thus, there can be no exposure control means that automatically adjusts the exposure value such that the rate of pixels becomes a predetermined rate.

Further in regards to independent claim 19, neither Van de Poel nor Kim even when taken in combination discloses or suggests brightness analyzing means for computing a histogram of the brightness of the pixels which is defined based on the maximum value. Yet again, defining brightness based on chrominance is absent from the applied art. This is particularly true when the brightness analyzing means is read in combination with the data transformation means that automatically performs a data transformation process on the basis of the brightness histogram so that a rate of pixels is made to be a predetermined rate.

The discussion above largely focuses upon Van de Poel because the Office Action largely bases the rejection on Van de Poel's teachings. Van de Poel has been extensively discussed above and is clearly lacking in many of the claim features in each of the independent claims. Applicant further asserts that Kim fails to remedy any of the noted deficiencies in Van de Poel. A closer

examination of Kim and the combination of Van de Poel and Kim is in order.

Kim is relied upon to teach a pipeline processing technique to perform a brightness adjustment on a captured image. Kim includes a luminance extractor 100 and mean matching histogram equalizer 200 the output of which is used by color compensator 300 to correct the RGB pixel components.

Kim is not relied upon and indeed does not disclose or suggest determining a rate of pixels based on the number of pixels having a maximum brightness as variously recited in the independent claims. Kim is not relied upon and indeed does not disclose or suggest making an adjustment to the pixel value based on the rate (claim 1); making an adjustment to an exposure value on the basis of the brightness histogram so that the rate of pixels becomes a predetermined rate (claim 9); data transformation means for performing a data transformation process on the acquired digital data on the basis of the brightness histogram such that the rate of pixels is made to be a predetermined rate (claim 13); automatically making an adjustment to the pixel value based on the rate (claim 17); exposure control means for automatically making an adjustment to an exposure value on the basis of the histogram such that a rate of pixels becomes a predetermined rate (claim 18); or data transformation means for automatically performing a data

transformation process so that a rate of pixels is made to be a predetermined rate (claim 19).

Kim is relied upon to teach an automatic means of adjusting the current captured image instead of making the user make a manual adjustment to the camera. The Office Action concludes that it would have been obvious to utilize Kim's automatic adjustment features together with Van de Poel's density correction to arrive at the claimed invention.

This conclusion of obviousness has an insufficient factual basis and lacks proper motivation to combine Van de Poel with Kim. In addition, there are several significant features from each of the independent claims which are clearly absent from Van de Poel or Kim, even when taken in combination. These specific features are argued above. In order to establish *prima facie* obviousness, all claim limitations must be taught or suggested in the prior art. In *re Royka*, 180 U.S.P.Q. 580 (C.C.P.A. 1974). The lack of motivation and additional features lacking from the combination are argued below.

While it is true that Van de Poel discloses a manual adjustment, this manual adjustment of the camera is for future images, not the current image. The Office Action recognizes this deficiency (see page 3, lines 7-8) but fails to give it proper consideration. Kim, on the other hand, adjusts the color signals

automatically by varying a color signal based on the adjusted luminance while enhancing image contrast. Applicant emphasizes that the adjustment of the camera for future use is quite different than and not combinable with adjustment of the current image data. This is exactly what the Office Action proposes and it is not understood how this combination is tenable or where there is motivation to make this combination.

Indeed, it is not understood where the motivation is derived for combining Van de Poel with Kim other than using the present specification as a guide to combine these references. Thus, it appears that the Examiner is applying hindsight reconstruction which is clearly not permitted.

The Federal Circuit has made it very clear that "the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references. Combining prior art references without evidence of such a suggestion, teaching, or motivation simply takes the inventor's disclosure as a blueprint for piecing together the prior art to defeat the patentability - the essence of hindsight." *In re Dembiczak*, 50 U.S.P.Q.2d 1614, 1617 (Fed. Cir. 1999).

The required evidence of a teaching, suggestion, or motivation to make the cited combination of references can be found either in

the prior art references themselves (the most typical location), the knowledge of one of ordinary skill in the art, or in some cases, from the nature of the problem to be solved. *Id.* The range of potential sources, however, does nothing to diminish the requirement for actual evidence. "The showing must be clear and particular" and cannot be met by broad conclusory statements. *Id.*

Furthermore, "[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination" M.P.E.P. at § 2143.01, citing *In re Mills*, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990).

Appellant respectfully submits that the Office Action fails to provide any evidence of a teaching, motivation, or suggestion that would cause one of ordinary skill in the art to combine Van de Poel with Kim.

Assuming solely for the sake of argument that Van de Poel could somehow be combined with Kim, this combination would still not result in the claimed invention. First of all, Kim's signal adjustment cannot be applied to Van de Poel's manual camera adjustment. Kim automatically varies the color signal of the current image and it is not understood how this signal adjustment can be applied or combined with Van de Poel's manual exposure time or gradation curve adjustment processes. Furthermore, how can one

know how to adjust the image data based on a determination made by Van de Poel? Van de Poel merely decides whether the image is overexposed and does not give any adjustment value. Furthermore, Van de Poel's basis of operation is image density and not luminance (or brightness). It is not understood how these two distinct bases of operation can be haphazardly combined as the Office Action suggests. In other words, determining whether an image is overexposed based on density and automatically correcting an image based on adjusted luminance are completely different concepts that cannot be combined as the Office Action suggests.

For all of the above reasons, taken alone or in combination, Applicant respectfully requests reconsideration and withdrawal of the § 103 Van de Poel - Kim rejection.

Conclusion

In view of the foregoing, Applicants respectfully submit that the application is in condition for allowance. Favorable reconsideration and prompt allowance are earnestly solicited.

Should the Examiner believe that anything further would be desirable to place this application in better condition for allowance, the Examiner is invited to contact Michael R. Cammarata (Reg. No. 39,491) at (703) 205-8000 to schedule a Personal Interview.

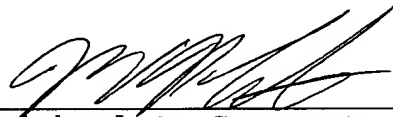
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Pursuant to the provisions of 37 CFR 1.17 and 1.136(a), Applicant respectfully petitions for a three (3) month extension of time for filing a response in connection with the present application. The required fee of \$950.00 is attached hereto.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment from or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §1.16 or under 37 C.F.R. §1.17; particularly, the extension of time fees.

Respectfully submitted,
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